1. A process for removing etch residues from vias and for removing a photoresist mask used to form said vias in low k carbon-doped silicon oxide dielectric material while inhibiting damage to said low k silicon oxide dielectric material which comprises:

a) exposing said photoresist mask and said vias to a plasma formed from one or more reducing agents to remove at least a portion of said resist mask and at least at least a portion of said etch residues in said vias; and

b) then exposing said vias and any remaining portions of said resist mask to a plasma formed from one or more oxidizing agents to remove the remainder of said etch residues in said vias and any remaining portions of said photoresist mask.

2. The process of claim 1 wherein said one or more reducing agents are selected from the group consisting of ammonia, hydrogen, a mixture of ammonia and hydrogen, a mixture of ammonia and nitrogen, a mixture of hydrogen and nitrogen, and a mixture of ammonia, hydrogen, and nitrogen.

3. The process of claim 1 wherein said one or more reducing agents includes a source of hydrogen and a source of nitrogen.

4. The process of claim 1 wherein said plasma formed from said one or more reducing agents contains radicals and charged particles.

5. The process of claim 1 wherein said one or more oxidizing agents used to form said plasma includes oxygen.

6. The process of claim 1 wherein said one or more oxidizing agents used to form said plasma comprises a combination of oxygen and at least one further gas.

7. The process of claim 1 wherein said one or more oxidizing agents used to form said plasma comprises a combination of oxygen and at least one further gas selected from the group consisting of nitrogen and argon.

8. The process of claim 1 wherein said one or more oxidizing agents used to form said plasma consists essentially of a combination of oxygen and argon.

9. The process of claim 1 wherein said step of exposing said vias and any remaining portions of said resist mask to a plasma formed from one or more oxidizing agents further comprises exposing said remainder of said etch residues in said vias and any remaining portions of said photoresist mask to a directional beam of charged particles from said plasma formed from one or more oxidizing agents.

10. The process of claim 9 wherein said directional beam of charged particles is further characterized by the substantial absence of radicals.

11. The process of claim 1 wherein said step of exposing said photoresist mask and said vias to a plasma formed from one or more reducing agents further includes forming a coating on the sidewalls of said vias.

12. The process of claim 11 wherein said step of exposing said vias and any remaining portions of said resist mask to a plasma formed from one or more oxidizing agents further includes removing said coating formed on said sidewalls of said vias

13. The process of claim 1 wherein said step of exposing said photoresist mask and said vias to a plasma formed from one or more reducing agents further includes forming said plasma from one or more reducing agents which includes hydrogen and nitrogen, and an organo nitrogen coating forms on the sidewalls of sid vias.

14. The process of claim 13 wherein said step of exposing said vias and any remaining portions of said resist mask to a plasma formed from one or more oxidizing agents further includes removing said organo nitrogen coating formed on said sidewalls of said vias.

15. The process of claim 1 which includes the further step of exposing said etch residues from formation of said vias and removal of said photoresist mask to a wet solvent to remove further residues.

16. A process for removal of a photoresist mask used to etch openings in a layer of carbon-doped low k carbon-doped silicon oxide dielectric material, and for removing etch residues remaining from either said etching of said openings or said removal of the photoresist mask, while inhibiting damage to said low k dielectric material, which comprises:

a) providing an integrated circuit structure comprising a layer of low k carbon-doped silicon oxide dielectric material having openings etched therein and a photoresist mask formed over said low k dielectric layer;

b) exposing the integrated circuit structure to a plasma formed from one or more reducing agents to remove at least a portion of said resist mask, and to remove at least a portion of:

i) said residues remaining from formation of said openings in said layer of low k carbon-doped silicon oxide dielectric material; or

ii) said residues remaining from removal of said resist mask; or

iii) residues remaining from both said formation of said openings in said layer of low k carbon-doped silicon oxide dielectric material and said removal of said resist mask;

c) then exposing said integrated circuit structure to an anisotropic etch comprising a plasma formed from one or more oxidizing agents to remove any remaining residues from both said formation of said openings in said layer of low k carbon-doped silicon oxide dielectric material and said removal of said resist mask.

17. The process of claim 16 wherein said one or more reducing agents includes a source of hydrogen and a source of nitrogen.

18. The process of claim 16 wherein said one or more oxidizing agents used to form said plasma comprises a combination of oxygen and at least one further gas selected from the group consisting of nitrogen and argon.

19. The process of claim 16 wherein said step of exposing said vias and any remaining portions of said resist mask to a plasma formed from one or more oxidizing agents further comprises exposing said remainder of said etch residues in said vias and any remaining portions of said photoresist mask to a directional beam of charged particles from a plasma of said one or more oxidizing agents, and further characterized by the substantial absence of uncharged radicals.

20. A process for removing etch residues from vias and for removing a photoresist mask used to form said vias in low k carbon-doped silicon oxide dielectric material while inhibiting damage to said low k silicon oxide dielectric material using a reducing plasma followed by an oxidizing plasma by which comprises:

a) exposing said photoresist mask and said vias to a plasma formed from one or more reducing agents selected from the group consisting of ammonia, hydrogen, a mixture of ammonia and hydrogen, a mixture of ammonia and nitrogen, a mixture of hydrogen and nitrogen, and a mixture of ammonia, hydrogen, and nitrogen, to remove at least a portion of said resist mask and at least at least a portion of said etch residues in said vias; and

b) then exposing said vias and any remaining portions of said resist mask to a directional beam of charged particles from a plasma of said one or more oxidizing agents, and further characterized by the substantial absence of uncharged radicals, said one or more oxidizing agents further comprising a combination of oxygen and at least one further gas selected from the group consisting of nitrogen and argon, to remove the remainder of said etch residues in said vias and any remaining portions of said photoresist mask.